

## **REMARKS**

This Amendment is fully responsive to the final Office Action dated February 3, 2009, issued in connection with the above-identified application. A request for continued examination (RCE) accompanies this Amendment. Claims 1-16 were previously pending in the present application. With this Amendment, claims 1, 9, 15 and 16 have been amended; and claim 17 has been added. No new matter has been introduced by the amendments made to the claims, or by the new claim added. Favorable reconsideration is respectfully requested.

In the Office Action, the specification has been objected to for failing to provide proper antecedent basis for the claimed subject matter. Specifically, the Examiner alleges that the specification fails to include proper antecedent basis for the claimed “computer-readable recording medium,” in claim 16. With regard to this rejection, the Applicants’ disclosure describes and illustrates one or more memory devices capable of storing a program (see e.g., Fig. 1 and pg. 7, line 31-pg. 8, line 1).

The Applicants have herein amended the Applicants’ disclosure to clarify that “program memory unit” is a “computer-readable storage medium.” Additionally, the Applicants have amended claim 16 to be consistent with the amendments made to the specification. As amended, the specification now provides proper antecedent basis for the claimed “computer-readable storage medium” now recited in claim 16. Withdrawal of the objection to the specification is respectfully requested.

In Office Action, claims 1 and 13-14 have been rejected under 35 U.S.C. 101 as being directed to non-statutory subject matter. Specifically, the Examiner alleges that claims 1 and 9 recite an apparatus comprising a plurality of units (e.g., signing unit, time slot switching unit, task selection unit, generating unit and control unit), and according to the specification (i.e., ¶[0047]) the plurality units are software. Thus, the Examiner alleges that the apparatus claims recite only software without any associated hardware, and software alone is non-statutory subject matter.

The Applicants have amended independent claims 1 and 9 recite “a memory unit in which programs for causing the respective units to function are stored; and a processor which executes the programs.” As amended, independent claims 1 and 9 now include the associated hardware such that the functionality of the “units” recited in the claims can be fully realized.

The subject matter of independent claims 1 and 9 are now believed to be directed to statutory subject matter within the meaning of 35 U.S.C. 101. Withdrawal of the rejection to claims 1 and 9 under 35 U.S.C. 101 is respectfully requested.

In the Office Action, claim 16 has been rejected under 35 U.S.C. 112, first paragraph, for failing to comply with written description requirements under U.S. patent law. Specifically, the Examiner alleges that claim 16 is directed to a “computer-readable recording medium.” However, the Examiner alleges that the specification doesn’t sufficiently disclose a computer-readable medium.”

As noted above, the Applicants’ disclosure describes and illustrates one or more memory devices capable of storing a program (see e.g., Fig. 1 and pg. 7, line 31-pg. 8, line 1). Additionally, the Applicants have herein amended the Applicants’ disclosure to clarify that at least the “program memory unit” is a “computer-readable storage medium.” Additionally, the Applicants have amended claim 16 to be consistent with the amendments made to the specification. Accordingly, withdrawal of the rejection to claim 16 under 35 U.S.C. 112, first paragraph, is respectfully requested.

In the Office Action, claims 9-14 have been indicated as allowable if rewritten or amended to overcome the rejections under 35 U.S.C. 101. As noted above, independent claim 9 (as amended) includes the associated hardware such that the functionality of the “units” recited in the claims can be fully realized. The subject matter of independent claim 9 is now directed to statutory subject matter within the meaning of 35 U.S.C. 101. Therefore, the rejections under 35 U.S.C. 101 is believed to be overcome. Accordingly, claims 9-14 should be allowable without further comment being necessary.

In the Office Action, claims 1, 3-5, 15 and 16 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama (U.S. Patent No. 6,430,594, hereafter “Akiyama”) in view of Anderson et al. (U.S. Patent No. 5,628,013, hereafter “Anderson”). The Applicants have amended independent claims 1, 15 and 16 to help further distinguish the present invention from the cited prior art. For example, claim 1 (as amended) recites the following features:

“[a] task switching apparatus for switching execution of a task assigned to a time slot by switching time slots in a processor, comprising:

an assigning unit operable to assign, on a one-to-one basis, each of a plurality of first

tasks to a corresponding one of first time slots among a plurality of time slots within a predetermined period, and assign a plurality of second tasks different from the plurality of first tasks to a single second time slot among the plurality of time slots within the predetermined period, the plurality of first tasks each having an assignment time, the plurality of second tasks each having a priority classification, and the single second time slot not for being assigned to any of the plurality of first task;

a time slot switching unit operable to switch time slots when an execution time of a task reaches an assignment time;

a task selecting unit operable to select a first task from the plurality of first tasks assigned to the first time slots when said time slot switching unit switches a current time slot to a time slot other than the second time slot, and to select at least one second task from the plurality of second tasks assigned to the second time slot when the current time slot is switched to the second time slot;

a memory unit in which programs for causing said respective units to function are stored;  
and

a processor which executes the programs,

wherein said task selecting unit is operable to select the at least one second task from among the plurality of second tasks according to the priority classification.”

The features emphasized above in independent claim 1 are similarly recited in independent claims 15 and 16. Specifically, claim 15 is directed to a task switching method; and claim 16 is directed to a computer-readable storage medium, which both recite steps directed to the features of task switching apparatus of independent claim 1. Additionally, the features of the present invention (as similarly recited in independent claims 1, 15 and 16) are fully supported by the Applicants’ disclosure.

The present invention (as similarly recited in independent claims 1, 15 and 16) is characterized by (i) including an assigning unit (or step) operable to assign, on a one-to-one basis, each of a plurality of first tasks to a corresponding one of first time slots among a plurality of time slots within a predetermined period, and assign a plurality of second tasks different from the plurality of first tasks to a single second time slot among the plurality of time slots within the predetermined period, the plurality of first tasks each having an assignment time, the plurality of

second tasks each having a priority classification, and the single second time slot not for being assigned with any of the plurality of first tasks.

Additionally, a time slot switching unit (or step) is operable to switch time slots when an execution time of a task reaches assignment time; and a task selecting unit (or step) is operable to select a first task from the plurality of first tasks assigned to the first time slots when said time slot switching unit switches a current time slot to a time slot other than the second time slot, and to select at least one second task from the plurality of second tasks assigned to the second time slot when the current time slot is switched to the second time slot.

The present invention (as similarly recited in independent claims 1, 15 and 16) is also characterized in that “at least one second task has a priority classification, and said task selecting unit is operable to select the at least one second task from among the plurality of second tasks according to the priority classification.”

The features of the present invention (noted above) make it possible to reliably execute the first task within the predetermined period by causing the first task required to satisfy the processing performance in series to have an assignment time, while increasing the response of the second task by causing the second task not required to satisfy the processing performance in series to have a priority classification.

Accordingly, it is only necessary for a programmer to classify a task required to satisfy the processing performance in series to a first type without consideration to the priority of the task, while classifying a task not required to satisfy the processing performance in series to a second type. Since the programmer does not have to assign priority classifications to all of the respective tasks as mentioned above, the programmer can enjoy advantageous effects of facilitating program designing for securing the processing performance, and securing flexibility in program designing.

In the Office Action, the Examiner relies on Akiyama in view of Anderson for disclosing or suggesting all the features recited in independent claims 1, 15 and 16. However, the Applicants asserts that Akiyama in view of Anderson fails to disclose or suggest all the features recited in independent claims 1, 15 and 16, as amended.

Akiyama discloses a real-time operating system (OS) that can perform quick switching between a plurality of tasks. The system in Akiyama is configured to have task schedulers each

of which (i) is provided for an associated one of task blocks each storing a corresponding one of groups of tasks and (ii) manages the tasks stored in the associated task block without accessing the real-time OS. In other words, the real-time OS has to switch the task blocks only when task switching is performed between tasks stored in different task blocks (see e.g., col. 2, lines 7 to 9; and col. 3, lines 46 to 64).

Anderson discloses a method of allocating an appropriate processing time to a frame such that the time required to process a real-time task associated with the frame does not exceed the total processing time of the frame. The method in Anderson installs an additional task in a task list in the case where the available processing time is sufficient to process the additional task; and generates a signal to indicate that the task cannot be installed in the opposite case (see col. 2, lines 62 to 67; and col. 3, lines 38 to 49).

In summary, the present invention (as similarly recited in independent claims 1, 15 and 16) is distinguishable over the cited prior art for at least the reasons noted below.

First, the present invention is characterized by selecting one of second tasks by comparison of the priority classifications and bringing the selected second task into an execute state when a time slot assigned with the first task is switched to a time slot assigned with the second tasks.

Conversely, Akiyama fails to disclose a key point of selecting one of second tasks by comparison of the priority classifications when frames are switched (a frame in Akiyama corresponds to a time slot in the present invention). And, Anderson is configured to add a real-time task to a frame such that the processing time for the real-time task does not exceed the total processing time of a frame, and thus does not disclose task switching.

Second, the present invention is characterized by assigning each of first tasks to a corresponding one of time slots, while assigning second tasks to a single time slot.

Akiyama discloses assigning a task list to a frame, but fails to disclose the number of tasks which are assigned to the frame. Additionally, Anderson is configured to add a real-time task to a frame such that the processing time for the real-time task does not exceed the total processing time of a frame, and thus does not disclose switching tasks

Finally, the present invention is characterized by determining the priority classifications according to which the second tasks are executed. Akiyama discloses executing the tasks in the

task list in a top to bottom order (see col. 7, lines 43 to 44), but fails to disclose priority-based task execution; and Anderson is configured to add a real-time task to a frame such that the processing time for the real-time task does not exceed the total processing time of a frame, and thus does not disclose priority-based task execution.

Based on the above discussion, no combination of Akiyama and Anderson would result in, or otherwise render obvious, independent claims 1, 15 and 16. Additionally, no combination of Akiyama and Anderson would result in, or otherwise render obvious, claims 3-8 and 17 at least by virtue of their dependencies from independent claim 1.

In the Office Action, claim 6 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama in view of Anderson, and further in view of Goldick (U.S. Publication No. 2003/0093457, hereafter “Goldick”); claim 7 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama in view of Anderson, and Goldick, and further in view of Hoogerbrugge (U.S. Publication No. 2006/0069738, hereafter “Hoogerbrugge”); and claim 8 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama in view of Anderson, and further in view of D’Souza (U.S. Patent No. 6,052,707).

Claims 6-8 depend from independent claim 1. As noted above, Akiyama in view of Anderson fails to disclose or suggest the features recited in independent claim 1 (as amended). Additionally, Goldick, Hoogerbrugge and D’Souza fails to overcome the deficiencies noted above in Akiyama and Anderson. Accordingly, no combination of Akiyama and Anderson with Goldick, Hoogerbrugge or D’Souza would result in, or otherwise render obvious, claims 6-8 at least by virtue of their dependencies from independent claim 1.

In view of the above, the Applicants respectfully submit that all the pending claims are patentable over the prior art of record. Thus, the Applicants respectfully request that the Examiner withdraw the rejections presented in the outstanding Office Action, and pass the application to issue.

The Examiner is invited to contact the undersigned attorney by telephone to resolve any remaining issues.

Respectfully submitted,

Kunihiko HAYASHI et al.

/Mark D. Pratt/

By: 2009.04.24 13:40:49 -04'00'

Mark D. Pratt

Registration No. 45,794

Attorney for Applicants

MDP/ats  
Washington, D.C. 20006-1021  
Telephone (202) 721-8200  
Facsimile (202) 721-8250  
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